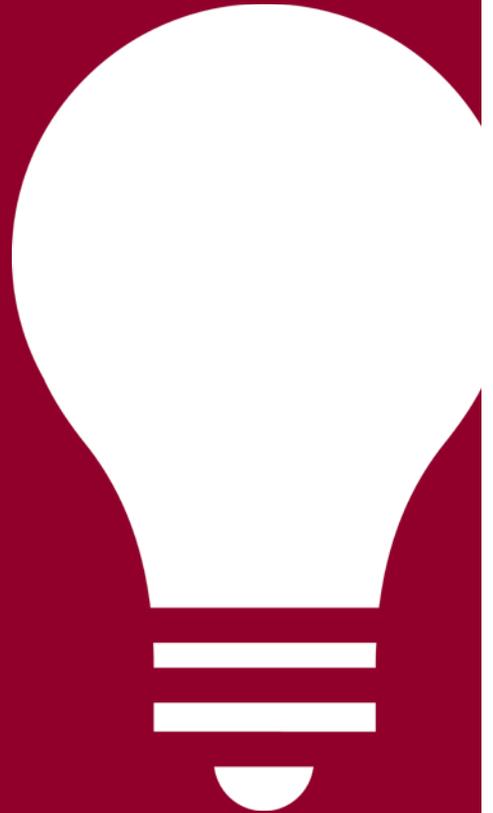


Research on Effective Government:
**A Workshop on Evaluating
Innovative Approaches to Fostering
Environmental Compliance**

January 27, 2017
Resources and Conservation Center
1400 16th Street NW
Washington, DC



WORKSHOP SUMMARY AND NEXT STEPS

This report summarizes workshop discussions. It is not an official document. The views expressed are those of individual workshop participants and do not imply endorsement by the regulatory agencies or institutions for which they work.

A WORKSHOP ON EVALUATING INNOVATIVE APPROACHES TO FOSTERING ENVIRONMENTAL COMPLIANCE

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LETTER FROM WORKSHOP ORGANIZERS

How can research inform the pursuit of innovative approaches to fostering environmental compliance? On January 27, 2017, representatives of federal and state environmental regulatory agencies joined with social science researchers for a workshop designed to answer that question.

Too often, researchers and agencies operate in parallel worlds, with researchers pursuing questions that may have little relevance to practice, and agencies experimenting with new approaches without the benefit of rigorous evaluation. The workshop brought researchers and agencies together—first, to identify research questions that are critical to advancing innovative environmental policy, and second, to outline a process of joint inquiry and learning that could support agencies as they identify and implement the most promising approaches.

The United States Environmental Protection Agency (EPA) and state agencies had identified in advance four key areas they considered ripe for innovation: (1) Monitoring, (2) Rule and Permit Design, (3) Reporting and Transparency, and (4) Innovative Enforcement. After an initial welcoming session that laid out the goals of the workshop, participants broke into groups to address each area. In each group, discussion began with a brief review of the academic literature on the topic. Participants then identified research questions that would help inform the design and implementation of innovative approaches. At a final plenary session, participants identified steps they could take to foster further collaboration.

Like the workshop, this report represents a collaboration among agencies and researchers, framing the pursuit of innovative compliance from each institution's perspective. It begins with a summary of the opening plenary in which researchers and agencies shared their reasons for organizing the workshop. It introduces the four workshop topics from the perspectives of agencies seeking new ways to foster environmental compliance and from academics who have studied the literature. It captures the research questions on the minds of those who attended. It ends with next steps that each institution may pursue, pending resources and time.

We organized the workshop with input from the US EPA Office of Enforcement and Compliance Assurance (OECA) and other US EPA offices. It would not have been possible without the contributions of many people, including Chrisna Baptista, Cary Coglianese, Leslie Cronkhite, Paul Ferraro, David Hindin, Jodi Short, Jon Silberman, Sally Simpson, Will Wheeler, and George Wyeth. We would also like to recognize the contribution of state participants and ECOS staff. Special thanks to Thomas Hegland and Taylor Yano for taking notes at the workshop and to Jennifer Nash of the Business & Environment Initiative at Harvard Business School for preparing this report.

We welcome your involvement as we carry this work forward. If you are a regulator interested in exploring how innovative compliance strategies might benefit your agency, or a researcher looking for ideas for research projects that will allow you to work directly with leading regulatory practitioners to advance regulatory effectiveness, please contact us. We would be delighted to discuss how you might engage in this work.

Katharine Abraham
Department of Economics
University of Maryland
kabraham@umd.edu

Jay Shimshack
Batten School of Public Policy
University of Virginia
jay.shimshack@virginia.edu

Michael Toffel
Harvard Business School
mtoffel@hbs.edu

EXECUTIVE SUMMARY

WORKSHOP GOALS AND OBJECTIVES

In the face of ever-tightening budgets, environmental protection agencies need to achieve progressively higher levels of performance with less investment. Innovative approaches, such as the use of new monitoring technologies, have the potential to lower inspection costs for agencies and compliance costs for facilities. But how do regulators know if an approach is truly an effective use of resources? In this workshop, EPA and states turned to researchers to discuss how innovative approaches can be evaluated for their utility in achieving and sustaining regulatory compliance. EPA and states provided ideas for identifying programs ripe for evaluation.

The objectives of the workshop were to:

- Identify research questions that are critical to advancing innovative environmental policy
- Outline a process of joint inquiry and learning that could support agencies as they identify and implement the most promising approaches.

DESCRIPTION OF BREAKOUT SESSIONS

During breakout sessions, participants discussed four areas identified as being ripe for innovation: (1) Monitoring, (2) Rule and Permit Design, (3) Reporting and Transparency, and (4) Innovative Enforcement. At a final plenary session, participants identified steps they could take to foster further collaboration.

Each breakout session began with a lead researcher summarizing results from existing studies, followed by discussions among participants. The discussions were focused on approaches to improve compliance rates, potential issues that might positively or negatively impact compliance, and study designs to test program ideas.

- *In the Monitoring session*, participants discussed the role of monitoring technologies in measuring emissions to spur improvement of facility compliance; the effects of third-party inspections or third-party monitoring on facility compliance; and whether the compliance rates for facilities are impacted by how and what is monitored, who does the monitoring, and publicizing of results.
- *In the Rule and Permit Design session*, the discussion focused on strategies to reduce regulatory complexity, the role of innovative technologies, the role of positive incentives, lessons from lean management approaches used in the private sector, and strategies for engaging the public.
- *In the Reporting and Transparency session*, participants discussed the role of “name and influence” programs in environmental regulation and discrepancies between performance self-reported by managers and performance observed by agencies during inspection.
- *In the Innovative Enforcement session*, participants explored how the content and medium of agencies’ communication affects facility compliance.

EXECUTIVE SUMMARY

KEY NEXT STEPS

In the final plenary session, workshop participants suggested steps to facilitate ongoing collaboration between agencies and researchers. The following immediate next steps are proposed:

- EPA staff will organize conference calls with participants who, during their sessions, expressed interest in working on specific projects. The calls will be used to identify potential environmental initiatives needing concept validation.
- EPA staff will begin organizing webinars and other efforts in order to share research results and inform researchers how to access environmental data.
- ECOS will ask its board to support a resolution endorsing the value of diverse and innovative compliance approaches and calling on US EPA to work with the regulated community and academic institutions to engage in projects to measure their effectiveness.¹
- ECOS will discuss the results of the workshop with its Compliance Committee.

Participants offered these additional suggestions for action:

- Regulators could periodically list their top research questions and develop a list of new programs they are preparing to launch. These lists would be shared with researchers so they know the priority areas.
- Because researchers often have difficulty finding and accessing environmental data, agencies could identify a data ombudsman to field researchers' questions; keep legacy versions of environmental data on file to make available upon request; and take advantage of the code researchers develop for cleaning data from agency databases.

¹ The ECOS board passed this [resolution](#) on April 8, 2017.

WELCOME REMARKS

WELCOME REMARKS

Mike Toffel, Harvard Business School

David Hindin, US EPA Office of Compliance

Alexandra Dunn, Environmental Council of the States

James Macy, Nebraska Department of Environmental Quality

In this session, speakers explained the challenges that had motivated them to convene and participate in the workshop.

Challenges faced by researchers:

- Researchers who study environmental regulation often choose research questions that have little relevance to those working in regulatory agencies. They miss opportunities to inform public policy.
- Even when academics study questions that agencies would like to have answered, practitioners may be unaware of their research. Findings do not get back to those who would benefit from them.
- Agencies have no easy way to obtain academic research that might help them. Academic research is often formal in style, with heavy use of jargon, and is published in scholarly journals that are expensive to access.
- As a result, agencies do not take advantage of the resources that academics are prepared to provide.

Challenges faced by agencies:

- Current policy regimes are the result of decades of regulatory accretion. They are complex and costly to manage, for both agencies and regulated facilities.
- Those who work in regulatory agencies need to know how to encourage facilities to achieve and sustain regulatory compliance as efficiently as possible. They face ever-tightening budgets and are expected to achieve progressively higher levels of performance. Under these circumstances, retaining a talented workforce can be particularly difficult.
- Innovative approaches, such as the use of new monitoring technologies, have the potential to lower inspection costs for agencies and compliance costs for facilities. EPA and states are exploring where innovative approaches can be most useful for achieving and sustaining regulatory compliance. The E-Enterprise Initiative of the Environmental Council of the States (ECOS) contains many important examples of innovative approaches.
- Evaluation can inform agency decisions about whether and when to use these innovations. States are looking for case studies that are replicable and can be implemented on a larger scale. Evaluating innovative programs is not easy; in many cases, evaluation requires agencies to design and implement programs as experiments. Agencies may lack expertise about experimental design. Enlisting researchers in program design could facilitate evaluation and result in more effective programs.

MONITORING

Academic Discussion Leader: Jodi Short, UC Hastings College of Law

Agency Discussion Leader: Leslie Cronkhite, EPA OECA

EPA Point of Contact: Leslie Cronkhite, EPA OECA

INTRODUCTION²

Monitoring technology is rapidly evolving. Traditional monitoring methods are expensive and involve taking periodic samples that must be sent to labs for analysis; new devices may be less expensive, or more continuous, or provide readings immediately, or can be operated remotely with readings fed electronically to a central database. Fenceline monitors are increasingly being used to measure pollution at the point of exposure. Optical imaging devices make it possible to spot leaks from a distance or assess the density of a plume of smoke more accurately than decades-old visual methods. Very low-cost sensors now exist that citizens and communities might use to assess pollution levels independently—both to inform their neighbors and to bring potential problems to the attention of regulators.

All of these tools could potentially drive better compliance. Clearly, they provide better information to the enforcement program, but of greater interest is the possibility that generating richer and more continuous information, and involving a wider range of parties in the generation of data, may both encourage and enable pollution sources to manage their operations more effectively even without further government intervention.

There is a substantial research literature on the role of monitoring in regulatory compliance. Research indicates that more heavily monitored facilities comply at higher rates than others and that clear, consistent communication of regulatory requirements leads to better compliance. Research also suggests that social and psychological factors can play a role in how agencies carry out monitoring responsibilities; for example, research suggests that inspectors may exercise a measure of leniency with facilities they perceive to be experiencing financial hardship or that have participated in voluntary “beyond compliance” programs. Inspectors who are more experienced and more highly trained tend to report higher numbers of violations, as are inspectors who are new to the particular facility they are auditing. Research has found that third-party monitors may be influenced by economic incentives—their auditing tends to be more lax in facilities run by those who pay them.³

² This introduction is based on a framing statement written by US EPA and [literature review that Jodi Short presented](#) in this session.

³ Selected publications:

- Duflo, E., M. Greenstone, R. Pande, and N. Ryan. 2013. “Truth-telling by third-party auditors and the response of polluting firms: Experimental evidence from India.” *Quarterly Journal of Economics* 128(4): 1499–1545.
- Hutter, Bridgett. 1989. “Variations in regulatory enforcement styles.” *Law & Policy* 11: 153-174.
- Rorie, Melissa, Sara Rinfret, and Michelle Pautz. 2015. “The thin green line: Examining environmental regulation and environmental offending from multiple perspectives,” *International Journal of Law, Crime and Justice*, <http://dx.doi.org/10.1016/j.ijlci.2015.01.002>.
- Short, Jodi L. and Michael W. Toffel, 2015. “[The Integrity of Third-Party Compliance Monitoring](#)”. Regulatory Policy Program, Harvard Kennedy School. RPP-2015-20. Cambridge, MA: Regulatory Policy Program.

MONITORING QUESTIONS AND DISCUSSION

Workshop participants identified seven questions concerning the role of monitoring technologies in advancing environmental regulation. These questions, along with key points of discussion, are noted below.

Monitoring Question 1

When does the use of advanced monitoring technology (e.g., stack, fence-line, or ambient) to measure emissions, or to publicize the monitoring data, spur facilities to improve compliance?

Monitoring technologies encompass many different approaches. Some technologies are best suited to determining whether a firm is in compliance (e.g. “Does my facility meet my water discharge permit?”), while others are useful for diagnosing problems (e.g. “Where is the leak in my pipe?”). In practice, monitoring requirements and technologies vary widely across industry, jurisdiction (federal or state), regulatory program, and facility size. As a result, agencies may lack information on the specific types of pollutants and operating parameters that are being monitored, the characteristics of the technologies being used, and the quality of monitoring data. Participants expressed interest in sharing information about technologies across agencies and departments and in rigorously evaluating the consequences of adopting new approaches.

Monitoring Question 2

If parties not associated with the government—researchers, trade associations, insurers, or citizen groups—collect and publicize real time pollution data, would facilities reduce their emissions or discharges?

Participants said that they would like to know more about how facility managers respond to public release of monitoring data. Disclosure may affect managers differently based on the size of their facility or parent company, industry, and the level of responsibility they feel toward the public, for example. Some research suggests that public ranking of facilities, based on their compliance rates, could improve the performance of outlier non-compliers. But if self-reported data are not reliable, disclosure could unfairly benefit or harm some facilities.

More and better public data could lead to unintended consequences if the public misinterprets what data mean. Pollution readings might trigger communities to perceive elevated risk, even if levels are within limits considered acceptable by agencies. Firms might “round the wagons” against the public and regulators in response. Alternatively, citizen monitoring could trigger firms to install their own monitoring technology in order to counter information provided by communities.

Monitoring Question 3

What aspects of performance are most important to monitor?

In choosing what to monitor, agencies and researchers should think critically about the dimensions of environmental performance that are most important for achieving policy goals. In the case of oil spills, for example, it would arguably be appropriate to monitor spill frequency and severity, rather than

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- Short, Jodi L., Michael W. Toffel, and Andrea R. Hugill. 2016. “[Monitoring Global Supply Chains.](#)” *Strategic Management Journal* 37 (9): 1878–1897. ([Video abstract \(4 minutes\)](#). [Working Knowledge article for practitioners.](#))
 - Short, Jodi L., and Michael W. Toffel. 2010. “Making Self-Regulation More Than Merely Symbolic: The Critical Role of the Legal Environment.” *Administrative Science Quarterly* 55: 361-396.

whether environmental practices in the oil tanker complied with regulations. By the same logic, monitoring at fenceline—near where vulnerable populations may live—may be more important than monitoring what’s coming out of the stack.

Monitoring Question 4

What new technologies offer greatest promise?

Participants noted that machine learning could help agencies target inspections more effectively. Satellite and infrared data could also be helpful in monitoring pollution. Because agency budgets are often very constrained, agencies often require that firms take responsibility for paying for the installation and maintenance of fenceline monitoring equipment. In some cases, regulated firms are buying data about their environmental performance from private firms in the business of emissions monitoring. Citizens often question the reliability of the data that’s privately collected, however.

Monitoring Question 5

What strategies are most effective for increasing inspector effectiveness?

The Ohio Environmental Protection Agency (Ohio EPA) recently required inspector rotation in every program. It subsequently saw an increase in the number of non-compliance incidents. Ohio’s experience suggests that inspectors who bring “a fresh set of eyes” to a facility or region identify more compliance problems. Certain types of training programs may also enhance inspectors’ effectiveness. Ohio EPA has implemented a baseline training program for all inspectors with the goal of making inspections more uniform. The format could be shared with other states. The Nebraska Department of Environmental Quality (NE DEQ) is considering convening its engineers to review new permit applications collaboratively to enhance knowledge-sharing and cross training. The Washington, DC, Department of Energy & Environment (DC DOEE) has been cross training inspectors between programs and between facilities. Pairing inspectors is another strategy to enhance effectiveness. [Experience from the health care industry](#) suggests that when inspectors are paired, the number of violations detected increases. Each of these approaches may enhance the ways that agencies are perceived by the public in terms of their professionalism and trustworthiness.

An increase in the number of violations found does not, on its own, mean that inspections are more effective, however. Some approaches, such as inspector pairing, have the potential to increase agencies’ costs. Research could be helpful in clarifying the benefits, as well as costs, of these approaches.

Monitoring Question 6

Announced versus unannounced inspections—which are more effective? How does announcing an inspection affect its effectiveness?

Some regulations require unscheduled (unannounced) inspections. Is there a sound basis for this requirement? If an inspection is scheduled (announced in advance), do facility managers prepare for it? If so, how, and what are the implications for environmental quality? Research is needed to compare the outcomes inspectors find in each type of inspection. Agencies could couple scheduled inspections with unscheduled follow-ups to assess how long regulated entities remain in compliance.

Monitoring Question 7

What is the role of third-party verification in enforcement? Under what conditions can third parties supplement or replace self-reporting? When can it supplement or replace agency inspections?

Maryland uses third parties for several programs, including leading inspections and overseeing Chesapeake Bay efforts. Ohio EPA has certified professionals for water quality and brownfields remediation. Both states have data on third-party verifier programs and state audits of third-party inspection results.

RULE AND PERMIT DESIGN

Academic Discussion Leader: Cary Coglianese, University of Pennsylvania

Agency Discussion Leader: Jon Silberman, EPA OECA

EPA Point of Contact: Leslie Cronkhite, EPA OECA

INTRODUCTION⁴

Achieving the intended health and environmental benefits of rules and permits depends on widespread regulatory compliance. Compliance data are too often missing or incomplete, but where they exist substantial non-compliance is often evident. While robust compliance monitoring and enforcement will remain critically important for identifying and addressing violations and promoting deterrence, moving beyond the status quo to routine high compliance requires governments to develop more effective rules and permits that build in public accountability, self-monitoring, self-certification, electronic reporting, and other innovative methods to improve compliance. Regulators will need to:

- Design more effective regulations and permits that are easier to implement, drive improved compliance, and achieve better environmental outcomes.
- Use and promote advanced pollutant detection technology in rules so that regulated entities, the government, and the public can more easily “see” and prevent or respond to pollutant discharges, environmental conditions, and non-compliance.
- Expand transparency by making the information we have today more accessible, and making new information obtained from advanced emissions monitoring and e-reporting publicly available, to provide more accurate, complete, and timely information to facilities, communities, and markets.

Research on rule and permit design tells us that no one regulatory approach fits all problems. There are no silver bullets. Agencies have a large number of regulatory tools to choose from; the challenge is to find the tool that best achieves the desired ends. Agencies can require that facilities adopt a particular pollution-control device (technology-based rule), achieve a specified level of performance (performance-based rule), or engage in internal goal setting, planning, and internal monitoring (management-based rule). Each approach has advantages and disadvantages. While technology-based standards have been effective in reducing emissions in many contexts, they provide little incentive for innovation and may quickly become out-of-date. Performance-based standards offer regulated entities greater flexibility, but these standards only work well when agencies can readily monitor and assess performance, which is often difficult. Management-based standards provide facilities with flexibility, but since they only require that managers plan, set goals, and measure progress they do not always achieving policy goals. There is currently no common language for rule and permit design—many definitions and concepts still need to be worked out. Challenges include defining the different types of rules, defining design elements, identifying conditions for use of different elements, and selecting the criteria for measuring performance.⁵

⁴ This introduction is based on a framing statement written by US EPA and [literature review that Cary Coglianese presented](#) in this session.

⁵ Selected publications:

RULE AND PERMIT DESIGN QUESTIONS AND DISCUSSION

Participants in this session identified six questions for further exploration. Questions focused on strategies to reduce regulatory complexity, the role of innovative technologies, the role of positive incentives, lessons from lean management approaches used in the private sector, and strategies for engaging the public. Key questions and points of discussion are noted below.

Rule and Permit Design Question 1

When does reducing regulatory complexity in rules and permits improve compliance? What are the best ways to reduce regulatory complexity?

Participants said that regulatory complexity may be a key factor inhibiting firms' regulatory compliance. If managers do not understand their obligations under the law, compliance is virtually impossible. But facility managers often lack information about the regulatory requirements that apply to them and when they may be operating outside compliance parameters. Turnover in agency staffing may compound the problem if inspectors are themselves unclear about what permits require. Does having state inspectors pre-review the draft permits for clarity and understandability before issuance improve compliance? Nebraska DEQ is currently experimenting with "permit assistance visits"—a new practice of sending state personnel to new facilities, modified facilities, and facilities with new environmental personnel. What are the results of that approach?

Preparing summaries of rules is another way to reduce complexity, but the cost to agencies is not trivial. Would investing resources to prepare summaries be worth the cost, and if so which rules should agencies summarize? Participants commented that this intervention may be underway already in New York or other states.

Several participants noted that compliance might increase if facility managers understood the rationale for the effluent limits in their environmental permits. That rationale might be a federal regulation, a state regulation, or a limit established specifically for an individual facility. In practice, the rationale is often unknown, both to the people operating the facility and the public. Would making that information explicit improve compliance? Do facilities comply better with their permit limits when the permits explain, in context, the health or environmental outcomes the limits are intended to achieve? With

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- Benneer, Lori S., and Cary Coglianese. 2012. "Flexible Approaches to Environmental Regulation," in Michael Kraft and Sheldon Kamieniecki, eds., *The Oxford Handbook of U.S. Environmental Policy*: 582-604.
 - Hindin, David A., and Jon D. Silberman. 2016. "Designing More Effective Rules and Permits." *Geo. Wash. J. Energy & Envtl. L.* 7: 103.
 - Hutter, Bridget M. 1997. *Compliance: Regulation and Environment*. Oxford socio-legal studies. Oxford University Press, Oxford, UK.
 - Coglianese, Cary, Jennifer Nash, and Todd Olmstead. 2003. "Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Regulation," *Administrative Law Review* 55: 705-729.
 - Coglianese, Cary, and David Lazer. 2003. "Management-Based Regulation: Prescribing Private Management to Achieve Public Goals," *Law & Society Review* 37: 691-730.
 - Richards, Kenneth. 2000. Framing Environmental Policy Instrument Choice. *Duke Environmental Law & Policy Forum*. 10: 221.

respect to compliance, does it matter whether permit limits are based on Effluent Limitation Guidelines (ELG), as compared to Surface Water Quality (SWQ) standards?

Rule and Permit Design Question 2

How can we make self-reporting and self-certification more accurate, for both quantitative metrics (e.g., permit limits) and non-quantitative requirements (e.g., required equipment or effort)? Would requiring regulated sources to use modern photographic, video, or web application methods to document or certify compliance improve performance relative to facilities using traditional paper documentation?

Rule and Permit Design Question 3

What are pros and cons of general permits vs site-specific permits?

One approach to reduce administrative burdens on both agencies and facility managers would be for agencies to issue general permits for whole classes of facilities, instead of site-specific permits tailored to particular facilities. General permits are less resource-intensive for agencies to prepare. General permits might also reduce compliance burdens on regulated entities. Are compliance rates different with these two types of permits?

Rule and Permit Design Question 4

What should be the role of positive incentives in regulatory programs?

Both EPA and states have experimented with programs that provide incentives for managers that achieve, and go beyond, regulatory compliance. In some cases, agencies exempt facilities from routine compliance inspections as an incentive. Some states have incorporated less frequent inspections into the environmental permits of high-performing facilities. Testing the effectiveness of reward programs presents challenges because a common incentive for participation is less rigorous regulatory oversight. Is recognition by an agency an effective incentive to facilities to improve compliance? Ohio's Encouraging Environmental Excellence Program is an example of an incentive-based approach.

Rule and Permit Design Question 5

How can regulatory agencies benefit from lean management approaches?

To what degree can agencies benefit from lean management approaches adopted widely in the private sector? Some participants observed that regulatory agencies do not produce environmental quality themselves; their role is to enable facility managers and other private actors to produce it. Can management scholars help agencies fulfill that role? Research could identify a change in agency management structure or methods and test the effectiveness of the new management approaches against the status quo. Under ECOS' E-Enterprise initiative, states have launched many projects geared toward improving the efficiency of regulatory programs. Has Ohio's application of a lean approach to its permitting process improved its internal operations, the quality of the permits it issues, or facility compliance with its permits? Has Arizona's embrace of lean management and "government at the speed of business" improved its internal operations, the quality of the permits it issues, or facility compliance?

Rule and Permit Design Question 6

Does enhancing public involvement through early public outreach and engagement produce better rules or improved regulatory compliance?

Next Generation approaches can have important impacts on those living adjacent to polluting facilities. Participants explored the question of who is responsible for environmental protection, and what level of responsibility, if any, community residents should bear. They noted that not all communities have the interest or capacity to be environmental watchdogs and some residents may object to what they perceive to be agency attempts to shift the burden of environmental compliance to them. These approaches may also result in sharing of information that is alarming to the public and that may trigger unintended consequences.

REPORTING AND TRANSPARENCY

Academic Discussion Leader: Jay Shimshack, University of Virginia

Agency Discussion Leader: George Wyeth, EPA OECA

EPA Point of Contact: Leslie Cronkhite

INTRODUCTION⁶

Rules, permits, settlements and other environmental program elements can be made more effective by designing them to help provide an array of stakeholders—governments, the public, customers, the financial services sector, academia, non-governmental organizations (NGOs), and the regulated entities themselves—with useful and reliable performance and compliance information. Publicizing relevant, user-friendly information can help improve results. Some research suggests that transparency serves a reminder function; publishing data on facility performance draws attention to problems and brings senior-level focus to bear on fixing them. Additionally, companies can see how their peers perform, and this can both confirm that better performance is possible and provide competitive incentive to improve.

Sharing more information with the public about strong performance can also provide a competitive edge. Disclosure and transparency also improve results motivating companies to devote effort up front to avoid problems that invite bad press, or scrutiny from neighbors, government, investors, and insurers.

The Emergency Planning and Community Right-to-Know Act and other related rules require industrial facilities to report annually to EPA and states on releases and transfers of toxic chemicals. EPA then compiles the data, performs some QA/ QC, and makes the data publicly available through the Web. Some studies have linked the public availability of EPA's Toxics Release Inventory (TRI) data to improved compliance and reduced pollution. The form of reporting may also affect behavior. Some reports must be filed with the regulators; others are simply maintained by the regulated facility to reduce burden. A large and growing literature spanning many disciplines suggests that transparency and disclosure tools can in some cases impact performance and compliance outcomes. They appear to work by making regulatory compliance more salient. Also, people tend to act differently (possibly more responsibly) when they are being watched. The track record for these tools is mixed, however. They appear to work best when they complement, rather than substitute for, formal regulation. Researchers have found mostly favorable results for "name and influence" programs, such as restaurant hygiene grade cards, and agency watch lists for air and water polluters. Researchers have found mostly unfavorable results for reporting and transparency programs that target corporate finance, campaign finance, medical malpractice, and a variety of other contexts. Since the cost of disclosure is not always low, research is needed to clarify how these programs work and the situations where they can be most beneficial.⁷

⁶ This introduction is based on a framing statement written by US EPA and [literature review that Jay Shimshack presented](#) in this session.

⁷ Selected publications:

- Evans, Mary F. "The Clean Air Act Watch List: An Enforcement and Compliance Natural Experiment." *Journal of the Association of Environmental and Resource Economists* 3.3 (2016): 627-665.

REPORTING AND TRANSPARENCY QUESTIONS AND DISCUSSION

Participants in this session identified three questions for further exploration. These questions concerned the role of “name and influence” programs in environmental regulation, discrepancies between performance self-reported by managers and observed by agencies during inspection, and the role of members of the public who live nearby regulated facilities. Key questions and points of discussion are noted below.

Reporting and Transparency Question 1

Would mandatory information disclosure regarding compliance affect facilities’ environmental performance?

Research indicates that “name and influence” programs—programs that disclose the names of facilities with poor environmental performance—work best when they complement, but do not substitute for, enforcement programs. During discussion, participants mentioned many additional factors that influence the impact of these programs, suggesting that designing these programs may be more complex than generally assumed. Because information that is salient to consumers is likely to be different from information that is salient to managers, effective programs target messaging to particular audiences. Companies that sell products directly to consumers tend to show a relatively high level of concern about their environmental performance; targeting name and influence programs on those companies, as opposed to commodity producers like oil or chemical companies, may be more likely to get results. Some large companies and government agencies pay close attention to the environmental performance of their suppliers, so finding ways to share information with them about suppliers’ conduct could be another effective approach. Participants noted that the effectiveness of these programs may diminish over time. The impact of the TRI disclosure program, for example, was greatest in the program’s first couple of years when some companies learned for the first time about the magnitude of their emissions and journalists, intrigued by TRI’s novelty, were eager to write about it. Has Minnesota’s public dashboard—which includes measures of restored water, restored contaminated land, and number of days of ozone exceedances, among other factors—impacted the compliance, performance, or outcomes of the state’s regulated facilities?

Participants raised the concern that, in the age of the Internet and social media, name and influence programs could continue to penalize facilities after they improve. Are mechanisms available to remove the stigma of shaming for firms that no longer deserve it? If not, what are the implications? If the

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- Kosack, Stephen, and Archon Fung. "Does transparency improve governance?." *Annual Review of Political Science* 17 (2014): 65-87.
 - Liu, Xian and Jay Shimshack. 2016. Does Mandatory Labeling of Outfall Points Influence Pollution and Compliance? Evidence from Ohio. *University of Virginia Working Paper*.
 - Loewenstein, George, Cass R. Sunstein, and Russell Golman. 2014. Disclosure: Psychology Changes Everything. *Annual Review of Economics*. 6:391–419
 - Shimshack, Jay P. 2014. The economics of environmental monitoring and enforcement. *Annual Review of Resource Economics*, 6 (1): 339-360.

quality of data used for identifying poor performers is questionable, the legitimacy of regulatory agencies may be questioned.

Reporting and Transparency Question 2

What explains the discrepancies between self-reported environmental performance and performance observed during inspections?

Participants acknowledged possible discrepancies between what facility managers self-report and what agencies discover in on-site inspections. They were uncertain, however, about the reasons for such discrepancies. Are facility managers lying? What research designs could help to answer that question? One approach might be for an agency to select at random two groups of facilities and remotely monitor emissions from one group. It could then compare reported and actual emissions from each. It could test whether managers reported emissions differently after being told that the agency was remotely monitoring them. Methane emissions can be monitored remotely, so methane producers might be good candidates for this type of study. Has the Natural Resources Defense Council program that attempts to reduce methane emissions from well pads through remote sensing by citizens proven effective?

Participants asked whether there are ways to design on-line reporting to encourage compliance and make false reporting easier to spot. Some on-line forms pop up with a warning when a manager reports an environmental parameter that exceeds regulatory thresholds. Do electronic pop-ups of that sort reduce truth-telling among facilities that self-report electronically? That question could be studied by comparing reported data when managers are told, “That’s a violation” to when the online form instructs managers merely to double check their inputs. Honest mistakes will be symmetrically distributed, while biased reporting will not be.

Reporting and Transparency Question 3

How do transparency and reporting programs impact communities? What is the track record of consent decrees that require firms to engage with communities?

Agencies have grappled with the challenge of how and when to share information with communities for decades—since at least the Love Canal disaster in the late 1970s—and have developed sophisticated communications capabilities. Still, challenges remain. If information is not actionable—if there is little residents can do to address environmental problems they learn about—frustration is the likely result. With that background in mind, participants explored questions about how to test the impact of disclosing information to communities. One approach would be to design an experiment that would compare the environmental performance of facilities in two contexts: communities where residents regularly receive information about facilities’ non-compliance and communities where residents have little or no access to that information. A second approach would be to explore the impact of sending residents email or text alerts when a given firm in their community violated an environmental rule. Research led by Paulina Oliva is exploring community responses to ambient air pollution alerts in Mexico. A third approach would be to provide some communities with emissions monitoring devices and then track any changes in facilities’ environmental conduct. Many types of monitors are now

inexpensive and portable. A new refinery rule issued by EPA requires fence-line monitoring. The accuracy of such monitors may be a problem, however.

Some compliance agreements now require community involvement, in some cases calling for auditing and emissions monitoring by community residents. Participants expressed interest in testing whether including a requirement for community oversight in consent agreements led to better and more lasting environmental performance.

INNOVATIVE ENFORCEMENT

Academic Discussion Leader: Sally Simpson, University of Maryland

Agency Discussion Leader: Chrisna Baptista, EPA OECA

EPA Point of Contact: Leslie Cronkhite, EPA OECA

INTRODUCTION⁸

Achieving the intended health and environmental benefits of rules, permits, and enforcement settlements depends on widespread regulatory compliance. By developing and using innovative enforcement approaches, regulators can help drive higher levels of compliance. Innovative enforcement approaches may include employing data analytics, innovative targeting, integrated enforcement strategies, and innovative enforcement settlements. EPA calls these approaches Next Generation tools.

To date, little research has been done to evaluate the impacts of Next Generation approaches. One promising area of inquiry might be to assess how regulated entities respond to different types of agency communication. Environmental agencies communicate with regulated entities through email, phone, and letters. The content of communication varies as well: sometimes facilities are simply informed that they have violated the law, and sometimes agencies offer compliance assistance as part of that message. To date, no one has studied whether facilities respond differently depending on the communication medium that environmental agencies use or the content of those messages. It is possible, however, to extrapolate from research in other contexts. A field experiment in Minnesota tracked how people responded to three different government messages concerning income tax compliance. When a random sample of taxpayers was told that their returns would be “closely examined,” some increased tax payments while others did not. On average, low- and moderate-income taxpayers who received that message paid more taxes, while high-income taxpayers did not. Findings suggest that people interpret messages differently depending on their socioeconomic characteristics. Other research has found that normative messaging (e.g. “Do this because it’s right”) tends to be ineffective. The lesson for agencies pursuing innovative compliance approaches is that they must craft messages carefully to achieve desired results.⁹

⁸ This introduction is based on a framing statement written by US EPA and [literature review that Sally Simpson presented](#) in this session.

⁹ Selected publications:

- Gray, Garry, and Susan Silbey. (2014). “Governing Inside the Organization: Interpreting Regulation and Compliance,” *American Journal of Sociology* 120(1):96-145.
- Ho, Daniel E. 2016. “Does Peer Review Work? An Experiment of Experimentalism,” 69 *Stanford Law Review*, 69: Available at SSRN: <https://ssrn.com/abstract=2785927>
- Muehlenbachs, Lucija, Stefan Staubli, and Mark A. Cohen. 2015. “The Impact of Team Inspections on Enforcement and Deterrence.” *RFF Discussion Paper*, RFF DP 13-36-REV2.
- Simpson, Sally S., Carole Gibbs, Melissa Rorie, Lee Ann Slocum, Mark A. Coeh, and Michael Vendenbergh. 2013. “An Empirical Assessment of Corporate Environmental Crime-Control Strategies.” *The Journal of Criminal Law and Criminology*. 103 (1): 231-278.
- Slemrod, Joel, Marsha Blumenthal, Charles Christian. 2001. “Taxpayer Response to an Increased Probability of Audit: Evidence from a controlled experiment in Minnesota.” *Journal of Public Economics* 79: 455–483.

INNOVATIVE ENFORCEMENT QUESTIONS AND DISCUSSION

Participants in this session identified two questions for further exploration concerning how the content and medium of agencies' communication affects facility compliance. These questions and key points of discussion are noted below.

Innovative Enforcement Question 1

How does the content of messages regulators use to communicate a facility's enforcement status affect a facility's response?

Agencies might look to other fields and organizations (e.g. psychology, marketing, the IRS) to identify effective ways to motivate managers' behavior. Does comparing a facility's performance to its peers' generate behavioral change? Does informing facility managers about the punishment of others improve compliance? Participants noted that in some cases, deterrent messages may backfire if they imply that non-compliance is commonplace. [Cialdini's work](#) examining normative messaging at Arizona's Petrified Forest National Park has relevance for this question, as does Dan Ariely's "The (Honest) Truth about Dishonesty." State agencies could work with researchers to test the impacts of different approaches by randomly assigning facilities to receive enforcement messages and monitoring their responses. Does the design of reporting forms, and specifically where on the form those completing them must sign, influence truthfulness? EPA has some examples of permits where the format has changed to encourage more truthfulness about certifications, e.g. by moving the signature line to the top of the form for a RCRA compliance certification.

Innovative Enforcement Question 2

How does the medium regulators use to communicate a facility's enforcement status affect the facility's response?

Agencies communicate with facility managers about their compliance status through a variety of means (e.g., automated vs human signature, robocall versus human call, text messaging). Research could test how managers interpret the signal content of each medium: the importance and urgency that is communicated and the amount of attention that each generates as messaging escalates. State agencies could work with researchers to randomly assign facilities to receive enforcement messages through different media to test impacts of different approaches.

WHAT DO RESEARCHERS WANT FROM AGENCIES—AND WHAT DO AGENCIES WANT FROM RESEARCHERS?

Mike Toffel, Harvard Business School

Paul Ferraro, Johns Hopkins University

David Hindin, EPA Office of Compliance

Will Wheeler, EPA National Center for Environmental Economics

In the final plenary session, workshop participants suggested steps to facilitate ongoing collaboration between agencies and researchers. Discussion focused on the themes of framing research questions, communicating results, and accessing data.

How can researchers learn what questions matter most to state and federal environmental agencies?

There is often a gap between the questions that researchers find most interesting and the questions that agencies need answered. To bridge that gap, participants offered these suggestions:

- Regulators could come up with their top ten social science research questions and provide the list to social science researchers every year or two. In collaboration with agencies, a few researchers (perhaps an advisory panel?) could then revise questions as necessary to make them amenable for study by researchers.
- Regulators could develop a list of programs they are thinking about starting and ask for input from researchers early in their program design process. In general, prospective studies are more useful to agencies than retrospective studies.
- Universities and agencies could co-organize a workshop—perhaps annually or every 18 months, with funding support—to discuss and clarify research questions and potential projects. Invite:
 - Federal and state regulators
 - Researchers, including social scientists and those working in technology applications
 - Environmental NGOs and citizen organizations
 - Regulated facilities

How can researchers best communicate research results to agencies?

Much academic research about regulatory practice is unknown to those working in regulatory agencies. The goal for many academics is to publish in top journals; there are few established channels to bring academic work to regulators' attention. Participants offered some low-cost ways to address this problem:

- EPA, coordinating with ECOS, could offer seminars or webinars to share research results. EPA's Office of Compliance, through the National Enforcement Training Institute (NETI), routinely holds webinars on environmental topics for state and EPA staff and managers. Last year this office offered 110 live webinars (30 to 90 minutes) through NETI for states and EPA. Perhaps insights and learnings from social science on how to design and implement a monitoring program would be a good topic for a new webinar later in 2017. Literature review slide decks

WHAT DO RESEARCHERS AND AGENCIES WANT?

presented at the workshop (found in [appendices to this report](#)) could easily be adapted to a webinar format.

- Researchers could produce a white paper series or blog, with the goal of posting one article/month. New “state of the science” working papers (similar to [Jodi Short and Michael Toffel’s paper on the integrity of private third-party compliance monitoring](#)) would be very welcome. A systematic review of the literature on a particular topic, that weights the literature by quality, is more helpful to agencies than the presentation of a single research paper.
- An updateable resource is needed—perhaps a wiki for inspection and compliance issues.

How can researchers access the data they need for analysis?

Researchers often do not know where data reside—at the local, state, or federal levels—and they often don’t know whom to ask when they run into problems. Agencies receive innumerable data requests each year, and budgets for managing data are constrained. Participants offered suggestions to help address these challenges:

- Each agency could designate a data ombudsman to field researchers’ questions.
- Agencies could develop guides to data sources and post them on their websites.
- EPA could offer a webinar for academics on ECHO: the data it contains, its caveats and gaps, and navigation tips.
- EPA could publicize the internship programs it offers academics to be “in residence” at EPA and use agency data.
- Environmental databases are subject to frequent revision; agencies could keep legacy versions on file and make them available upon request.
- Researchers and agencies could encourage researchers to share the code they develop for cleaning data from agency databases. In doing so, they would help others access these resources. The quality of research overall would improve.
- The Exchange Network collects and flows data from states to EPA. Researchers need to learn how to access these data.
- Will Wheeler and colleagues are proposing a paper entitled “Opportunities and Pitfalls with EPA Data: Perspectives from inside and outside the agency.”

CONCLUSION

In the face of ever-tightening budgets, environmental protection agencies need to achieve progressively higher levels of performance with less investment. Innovative approaches to fostering environmental compliance have the potential to lower costs for agencies and facilities while simultaneously strengthening compliance. But how do regulators know if an innovative approach is an effective use of resources? On January 27, 2017, state and federal regulators joined with university researchers to explore ways they might work together to learn which innovative approaches are the most effective and the conditions under which they work best.

Participants generated 18 research questions for further study, addressing innovations in monitoring, rule and permit design, reporting and transparency, and innovative enforcement. They also identified next steps that regulators and academics could take to catalyze new research on topics of importance to regulators, share research results, and facilitate access to data.

The workshop set the stage for continued collaboration among regulators and academics to improve understanding of the roles of innovative strategies in achieving the dual goals of effective compliance and resource efficiency. Workshop organizers welcome your involvement as participants carry this work forward.

State Regulator Participants

Photo not available

Sonia Altieri
Senior Advisor (on loan from U.S.
EPA)
Environmental Council of the States
saltieri@ecos.org

Be informed of current research for innovative approaches to foster environmental compliance.



Craig Butler
Director
Ohio Environmental Protection
Agency
Craig.butler@epa.ohio.gov

Compliance begins often with technical assistance and outreach. Ohio continues to emphasize our confidential technical assistance to Ohio companies as a way to facilitate compliance, or beyond compliance, and couple this assistance with access and connections to financial assistance mechanisms. Additionally, we work to use enforcement as a tool when necessary and when so, are creative in development of Supplemental Environmental Projects to benefit the community.



Kelly Crawford
Chief, Compliance & Enforcement,
Air Quality Division
DC Department of Energy &
Environment
kelly.crawford@dc.gov

Branch chief for compliance and enforcement sources of air pollution within in the District of Columbia.



Alexandra Dapolito Dunn
Executive Director and General
Counsel
Environmental Council of the States
adunn@ecos.org

Alexandra Dapolito Dunn is the Executive Director and General Counsel of the Environmental Council of the States (ECOS), the national non-profit, non-partisan association of U.S. state and territorial environmental commissioners. Dunn has two decades of experience in environmental law and policy, and presently works on legislation, policy, and regulatory matters affecting all media—including air, waste, water, and toxics. Dunn works with the E-Enterprise Leadership Council as well as other E-Enterprise (EE) management bodies overseeing the adaptive management and implementation of EE projects.

State Regulator Participants (continued)



Ben Grumbles
Secretary
Maryland Department of the Environment
ben.grumbles@maryland.gov

Ben Grumbles is Maryland's Secretary of the Environment. He is co-chair of the Advanced Monitoring Workshop of the ECOS-EPA E-Enterprise Leadership Council. Ben has served as Director of Arizona's Department of Environmental Quality, EPA Assistant Administrator for Water, and EPA Acting Associate Administrator for Congressional and Intergovernmental Relations.



Heidi Hollenbach
District Supervisor
Michigan Department of Environmental Quality, Air Quality Division
hollenbachh@michigan.gov

My work involves oversight of compliance and enforcement of air quality regulations in Michigan. This objective is accomplished through source inspections, complaint investigations, data review and interpretation, permitting, and enforcement. Our agency is interested in the exchange of ideas on new and innovative approaches to foster environmental compliance as well as improve community relations through increased transparency, communications, and enhanced monitoring.



Jim Macy
Director
Nebraska Department of Environmental Quality
jim.macy@nebraska.gov

I am interested in research or experience that demonstrates economic growth and environmental protection can be mutually achievable. I am interested in compliance assistance programs that have enforceable consequences. Discussions on use of next generation tools in times of budget constraints and staffing models for more responsive, adaptable (flexible) organizations.



Shannon McMillan
Compliance & Enforcement Program Manager
Air Pollution Control Division
Colorado Department of Public Health & Environment
shannon.mcmillan@state.co.us

The Colorado Air Pollution Control Division has direct experience in utilizing innovative tools for compliance oversight efforts and enforcement, including use of an Infrared (IR) Camera for both compliance assistance & enforcement, self-certification projects, partial compliance evaluations, inspector-led portable analyzer use for evaluating engine emissions & compliance, permit conditions/language review work group, and use of FAQs & guidance documents for implementing new regulations. In addition, the Division often works with NEIC/EPA in developing new monitoring tools and will be soon be implementing the use of a mobile monitoring unit. I'm also very interested to understand what tools are available and how they could be possibly incorporated into the Division's efforts to improve compliance.

State Regulator Participants (continued)



Evan Mulholland
Compliance Bureau Administrator --
Air Resources Division
New Hampshire Department of
Environmental Services
evan.mulholland@des.nh.gov

During my first year as Administrator of the Compliance Bureau at NHDES - ARD, I have tried to incorporate some ideas of Next Gen Compliance into our work. Specifically, we have drafted a strategic plan for the Bureau that attempts to improve compliance through publicizing emission data, simplifying and better organizing permit language, and incentivizing emission reductions. I am also very interested in real-time, low cost air pollution monitoring to help with public awareness and general compliance.



Kelly F. Poole
Program Manager, JD
Environmental Council of the States
(ECOS)
kpoole@ecos.org

Kelly Poole supports state team members participating in various E-Enterprise for the Environment initiatives. Working together, environmental leaders at EPA, the states and tribes, are utilizing the E-Enterprise model to simplify, streamline and modernize the business of environmental programs. Poole supports the E-Enterprise Advanced Monitoring Strategy and Implementation Team as they work to achieve their goals regarding the rapidly evolving market of environmental monitoring technology.



Scott Thompson
Executive Director
Oklahoma Department of
Environmental Quality
scott.thompson@deq.ok.gov

I have worked for Oklahoma over 30 years in several environmental programs including: superfund, hazardous waste, solid waste, underground injection control, radiation management, and brownfields. For three years I have been responsible for all the agency's environmental programs including air, water, laboratory, and local offices. Due in part to decreases in resources for many years, we have sought more effective and efficient enforcement processes.

U.S. Environmental Protection Agency Participants



Chrisna Baptista
Attorney-Advisor
U.S. EPA Office of Enforcement and
Compliance Assurance
baptista.chrisna@epa.gov

Member of EPA's Next Generation Compliance team, focused on state coordination as well as Next Gen tools in NPDES and RCRA permits.



Michael Barrette
Branch Chief, Integration Targeting
and Access Branch
U.S. EPA Office of Compliance
barrette.michael@epa.gov

I am interested in transparency, data analytics and targeting. I can present, if needed, on access to data sets and work that is coming in the pipeline for the Enforcement and Compliance History Online (ECHO) database.



Leslie Cronkhite
Program Analyst on the EPA Next
Gen Team
U.S. EPA Office of Enforcement and
Compliance Assurance
cronkhite.leslie@epa.gov

I have recently started working on EPA's Next Gen Team with a focus on Advanced Monitoring. In previous positions, I have worked on rule development and implementation for chemicals management and drinking water protections and voluntary program implementation, such as source water protection and securing industry commitments to change certain practices. Research describing efficacy of Next Gen components will be helpful considerations when the collective enterprise is designing environmental protection solutions.



Cynthia Giles
Assistant Administrator (formerly,
until January 20, 2017)
U.S. EPA Office of Enforcement and
Compliance Assurance
cynthia.giles@gmail.com

I launched Next Generation Compliance (Next Gen) at EPA. I have been working over the last eight years—with leadership from the amazing David Hindin—to increase EPA's focus on implementation as an essential part of good rule and policy design, and to bring knowledge from academic researchers to bear on environmental policy decisions. And EPA has been building innovation into EPA's enforcement work—making the most of advanced monitoring, new IT tools and creative thinking to allow EPA to be more effective, even in a time of declining budgets.

U.S. Environmental Protection Agency Participants (continued)

Photo not available

Debbie Goodwin
Information Management Specialist
U.S. EPA OLEM / ORCR / PIDD /
ORCR
goodwin.debbie@epa.gov

I have worked at EPA with the RCRA Subtitle C program's data system since 1991, first as a contractor supporting OECA and then as an EPA employee as the system administrator of the CM&E module for OECA until 2005. In 2005 I transferred to OSWER, now OLEM, to be a member of the RCRAInfo development team. I currently function as the RCRAInfo's team user support and customer training specialist.



David Hindin
Office Director
U.S. EPA Office of Compliance
hindin.david@epa.gov

Head of office overseeing Next Generation Compliance.



Bryan Hubbell
Senior Advisor on Social Sciences
U.S. EPA Office of Research and
Development
Hubbell.bryan@epa.gov

My interest is in integrating the principles, methods, and tools of the social and behavioral sciences into research and policy applications. I am also specifically interested in the social and behavioral impacts of the introduction of low-cost, widely available environmental sensors and related data, including these sensors affect interactions between communities and regulated sources.

Photo not available

Rebecca Kane
Lead Environmental Protection
Specialist
U.S. EPA
kane.rebecca@epa.gov

I manage EPA's Enforcement and Compliance History Online (ECHO) website.



Rob Maxfield
Senior Science Advisor - Advanced
Monitoring
U.S. EPA New England
maxfield.robert@epa.gov

Over thirty years of experience in the management and direction of environmental laboratories in the private sector and at EPA, most recently as Director of the EPA New England Regional Science Center. Currently acting as Senior Science Advisor to the Regional Administrator focused on the use of advanced monitoring technology to improve compliance, identify contamination in our air and water and clean-up contaminated sites.

U.S. Environmental Protection Agency Participants (continued)



Al McGartland
Director, National Center for
Environmental Economics
U.S. EPA Office of Policy
mcartland.al@epa.gov

My office is very interested in learning how we can better our programs (including enforcement) with the use of behavioral sciences broadly, and behavioral economics in particular. Ever since "NUDGE" there has been an explosion of promising economic research on how we can improve the effectiveness of our programs (bigger bang for the buck) by seeking to understand the cognitive processing and reactions of key actors.



David Meredith
Chief, Media Systems Section
U.S. EPA HQ / OECA / OC /
Enforcement Targeting and Data
Division
Meredith.david@epa.gov

Over the years, I've supervised and/or directly managed EPA large source databases that collect CAA/Stationary Source, CWA/NPDES, RCRA subtitle C, FIFRA, TSCA, EPCRA Section 313 compliance and enforcement data.



David Nicholas
Senior Advisor for eEnterprise
U.S. EPA Office of Land and
Emergency Management
Nicholas.david@epa.gov

I ensure that our waste management and emergency response regulations and policies proactively incorporate next generation compliance concepts such as online posting of compliance reports. I am also working closely with the states to accelerate the adoption of online systems for application, review and approval of environmental permits.

Photo not available

Fredrick No
Attorney-Adviser
U.S. EPA
no.fredrick@epa.gov

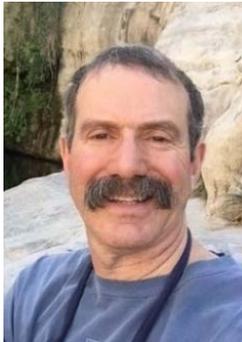
I field and respond to information/records requests from various media outlets, organizations, as well as Congressional inquiries. The collection, search, processing, review, and publication of responsive material is conducted electronically. As records and/or information can include email, texts, databases, phone logs, and/or any other source capable of retaining and/or transmitting data, knowledge of an agency's practices, procedures, policies, and overall infrastructure is integral.

U.S. Environmental Protection Agency Participants (continued)



Ron Shadbegian
Senior Economist
U.S. EPA National Center for
Environmental Economics
ronshadbegian@gmail.com

My previous work in compliance and enforcement focused on traditional compliance tools, but EPA is expanding its compliance toolbox and this workshop will help me to start thinking about alternative compliance mechanisms.



Jon Silberman
Senior Attorney-Advisor
U.S. EPA Office of Enforcement and
Compliance Assurance
silberman.jon@epa.gov

In my 33+ years with EPA, I've worked with inspectors to develop cases, represented EPA in numerous administrative enforcement actions, supported the Department of Justice in judicial enforcement cases, drafted rules and policies in all media, and promoted and published on deterrence, innovative rule and permit design, and environmental monitoring. But experience only tells us where we've been - it's applying our experience innovatively to new problems that stimulates progress.



David G. Smith PE PLS
Data Scientist
U.S. EPA
smith.davidg@epa.gov

Involved in EPA E-Enterprise efforts, APIs and tools for improving electronic reporting to achieve burden reduction, improved data integration and data quality. Managed EPA's Facility Registry Service and currently working for EPA's Chief Data Scientist.



Sharmin Syed
Environmental Protection Specialist
U.S. EPA Office of Wastewater
Management
syed.sharmin@epa.gov

I have been at EPA Headquarters in the National Pollutant Discharge Elimination System (NPDES) permitting program for over 10 years, working with states in implementing the Clean Water Act and NPDES regulations through state program assessments and as an instructor in the NPDES Permit Writers' Training Course. In the NPDES program, innovative technologies and next generation tools can provide new tools for the regulated community to meet permitting requirements. We look forward to learning and discussing new methods that may be available to permittees within the regulatory and permitting framework.

U.S. Environmental Protection Agency Participants (continued)



Catherine Tunis
Senior Analyst
U.S. EPA Next Generation
Compliance
tunis.catherine@epa.gov

As a senior analyst on EPA's Next generation Compliance Team, I am interested to see new academic research on the factors that affect compliance. Compliance is needed for the Nation to reap the benefits of our environmental laws, and these new understandings, when applied, can help improve compliance rates.

Photo not available

Jane Wallace
Deputy Division Director
U.S. EPA OECA/OC/ETDD
Wallace.jane@epa.gov

To attend as an observer as ETDD would like to understand the requirements from attendees so we can plan for supporting the needs in the future.



Will Wheeler
Economist
U.S. EPA National Center for
Environmental Economics
wheeler.william@epa.gov

As a member of the National Center for Environmental Economics, I spend a large fraction of my time supporting the Office of Enforcement and Compliance Assurance in a variety of ways. I am very interested in research projects that evaluate the effectiveness of traditional and Next Gen enforcement and have some projects in early stages.



George Wyeth
Senior Attorney
U.S. EPA Office of Enforcement and
Compliance Assurance
Wyeth.george@epa.gov

As an EPA attorney I have a strong interest in research that sheds light on the effectiveness of innovative strategies such as advanced monitoring and transparency, and program design choices with regard to features such as reporting and third-party validation of compliance. Such research can be directly applied by agency officials to improve our programs, and drive better compliance and better environmental outcomes.

Academic Participants



Cary Coglianese
Edward B. Shils Professor of Law;
Professor of Political Science;
Director, Penn Program on
Regulation
University of Pennsylvania
cary_coglianese@law.upenn.edu

I am currently engaged in research projects on enforcement of flexible regulatory instruments and on the use of machine learning by government, including in improving the targeting of limited enforcement resources.



Mark A. Cohen
Justin Potter Professor of American
Competitive Enterprise and Professor
of Law
Owen Graduate School of
Management
Vanderbilt University
mark.cohen@owen.vanderbilt.edu

My research has focused on how both monitoring and enforcement policies provide incentives for firms to comply with environmental regulations; including frequency and type of inspections and penalty policies. I have also worked on the role of mandatory and voluntary information disclosure and its impact on compliance.



Salo Coslovsky
Associate Professor of International
Development
New York University
Robert F. Wagner Graduate School of
Public Service
svc2@nyu.edu

In my research, I use qualitative methods to understand how front-line regulators engage with business managers and try to bring them into compliance. So far, I've done most of my research in Brazil, and studied problems related to the enforcement of environmental, labor, food safety, and urban land-use regulations. A key finding from my research is that front-line regulators often succeed not because they impose hefty fines or insist that firms adopt a given technology, but because they force managers to reassess (and transform) how their business operate.



Dietrich Earnhart
Professor
University of Kansas
earnhart@ku.edu

I am currently conducting two research studies on Next Generation Compliance. First, I am collaborating with David Markell and Robert Glicksman to explore how the incorporation of Next Generation Compliance elements into Clean Water Act (CWA) permits and CWA-related enforcement actions affects compliance with discharge limits. Second, I am exploring how the complexity of CWA permits affects compliance with discharge limits. Both studies should help the EPA and state environmental agencies to design permits in ways that facilitate compliance.

Academic Participants (continued)



Mary Evans
Jerrine and Thomas Mitchell
Associate Professor of Environmental
Economics
Claremont McKenna College
mevans@cmc.edu

My work in the area of enforcement and compliance has broadly focused on examining features of traditional (e.g., fines for non-compliance, probabilistic inspections) and non-traditional regulatory instruments (e.g., information disclosure) with a particular focus on the incentives they create for firms. Recent work explores the dual influences on compliance behavior of strategic interactions among firms in the regulatory environment and the product market. I am particularly interested in exploring the potential for natural and field experiments to inform our research in the area of compliance and enforcement.



Paul Ferraro
Bloomberg Distinguished Professor
Johns Hopkins University
pferraro@jhu.edu

Professor Ferraro collaborates with scientists, lawyers, engineers and program administrators to develop evidence-based environmental programs. His research aims to incorporate insights from the behavioral sciences into program designs and to measure program impacts on the environment and human welfare, particularly through randomized field experiments.



Robert Glicksman
J.B. & Maurice C. Shapiro Professor
of Environmental Law
The George Washington University
Law School
rglicksman@law.gwu.edu

I have worked on legal issues relating to environmental compliance for many years. My work has included several empirical studies with Dietrich Earnhart in which we evaluated the effectiveness on environmental behavior and performance of different federal and state enforcement actions. Recently, I have worked on several law review articles with David Markell (some published, some still in progress) that provide a framework for designing environmental compliance programs, using EPA's Next Generation Compliance initiative to illustrate the value of the framework.



Laura Grant
Assistant Professor
Claremont McKenna College
lgrant@cmc.edu

A large part of my research assesses whether or not environmental nonprofits assist with government monitoring and improve compliance with environmental regulations. The influence of nonprofit can substitute for or complement government action; understanding the direction of influence matters greatly for policy implementation and analysis. If and when formal mechanisms are unavailable, these nonprofit groups are critical tools for compliance and enforcement.

Academic Participants (continued)



Wayne Gray
John T. Croteau Professor of
Economics
Clark University
wgray@clarku.edu

I've been researching enforcement and compliance issues with OSHA and EPA regulation since the mid-1980s. Topics include electronic reporting of water pollutant discharges, effectiveness of different regulatory tools (penalties, enforcement, monitoring), and heterogeneity in responses to enforcement (firm size, profitability).



Katherine Grooms
Assistant Professor of Economics
Southwestern University
groomsk@southwestern.edu

My work focuses on the state level factors that alter enforcement and compliance with the Clean Water Act. I am interested in how to induce accurate monitoring and incentivize transparency between facilities and regulators.



Matthew Johnson
Research Scientist
Duke University Sanford School of
Public Policy
matthew.johnson@duke.edu

Much of my research focuses on understanding factors that determine regulatory effectiveness in the realm of health, safety and environment. For example, in several projects, my co-authors and I investigate the conditions under which OSHA inspections improve workplace safety outcomes. In other work, I investigate how publicizing companies that violate OSHA regulations influences future compliance.



David Konisky
Associate Professor
School of Public and Environmental
Affairs, Indiana University,
Bloomington
dkonisky@indiana.edu

My research investigates patterns of regulatory enforcement outcomes (e.g., inspections, informal and formal actions) across space and time. I am particularly interested in state level enforcement outcomes, and how they vary by political and economic attributes, as well as the equity (i.e., environmental justice) of enforcement outcomes across demographic and socioeconomic groups.

Academic Participants (continued)



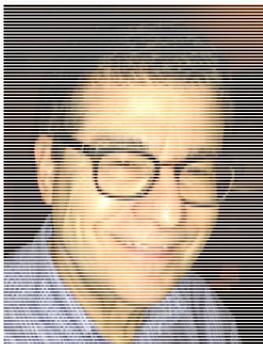
Dave Markell
Steven M. Goldstein Professor and
Associate Dean for Research
Florida State Univ. College of Law
dmarkell@law.fsu.edu

Have written books and many articles about environmental enforcement, including about Next Gen - see e.g., ABA article about Next Gen, Arizona Law Review article about Next Gen, etc.
Have spent several years doing environmental enforcement, with EPA/US DOJ, NY Department of Environmental Conservation (DEC), and NAFTA



John W. Mayo
Professor of Economics, Business and
Public Policy
Georgetown University
mayoj@georgetown.edu

I am very interested in the design and application of regulations, and their economic effects.



John Mendeloff
Professor
Graduate School of Public and
International Affairs
University of Pittsburgh
jmen@pitt.edu

I have extensive experience examining enforcement, information and consultation strategies at OSHA.



Jennifer Nash
Director, Business & Environment
Initiative
Harvard Business School
jnash@hbs.edu

My research explores the role of different regulatory approaches in strengthening the environmental performance of firms. I study voluntary programs run by government, self-regulatory programs run by industry, performance-based regulation, and management-based regulation. I seek to understand the types of environmental problems each approach is best able to address, how to design regulations so they best achieve environmental goals, and obstacles that may impede regulatory effectiveness.

Academic Participants (continued)



Caroline L. Noblet
Assistant Professor
School of Economics, University of
Maine
caroline.noblet@maine.edu

My research focuses on behavioral economics and the environment. I examine provision & use of information, the role of trust/credibility and social norms & motivation in design of, and response to, proposed environmental public policy and benefit-cost analysis.



Paulina Oliva
Associate Professor
University of California, Irvine
bolivava@uci.edu

I am interested in environmental policy effectiveness and have conducted research in this area. I have conducted research using randomized controlled trials in Africa to analyze the effectiveness of economic incentives in the adoption of new agricultural technologies with environmental benefits. I have also conducted research on the prevalence of corruption in smog check centers and used economic models to evaluate the effect of policy changes. Finally, I am currently working on the design of an RCT related to gas station self monitoring in California.



LeRoy (Lee) Paddock
Associate Dean for Environmental
Legal Studies
The George Washington University
Law School
lpaddock@law.gwu.edu

Early in my career I designed many of Minnesota's environmental enforcement laws. I have also worked on both EPA's audit law and its Performance Track program. I also worked with EPA on a Next Gen conference in 2014 and published a book based on that conference.



Michelle Pautz
Associate Professor of Political
Science
University of Dayton
mpautz1@udayton.edu

My research focuses on the interactions of those on the front-lines, namely environmental inspectors and members of the regulated community. Understanding the dynamics of these interactions informs how environmental regulations are implemented today and what might be possible for the future utilizing next generation compliance tools.

Academic Participants (continued)



Sara Rinfret
Assistant Professor of Public
Administration
University of Montana, Department
of Political Science
sara.rinfret@umontana.edu

Sara Rinfret is interested in how interactions impact environmental policy implementation. I have examined how the relationships interest groups and rule-writers at the state and impact the phases of administrative rulemaking. In addition, I have researched how the perceptions of regulators and the regulated impact compliance efforts. In 2012, we conducted a nationwide survey (with Michelle Pautz) about how regulators perceive the businesses they regulate and how this impacts environmental policy more broadly. And, most recently, we conducted a survey of the Montana regulated community and how they perceive environmental regulators. Both areas of research suggest a shift towards collaboration in order to ensure compliance with environmental laws.



Jay Shimshack
Associate Professor of Public Policy
and Economics
University of Virginia, Frank Batten
School of Leadership and Public
Policy
jay.shimshack@virginia.edu

Shimshack studies environmental regulation, environmental economics, corporate social behavior, and applied microeconomics for public policy. Much of his research focuses on the monitoring and enforcement of environmental law. He has longstanding interests in several Next Generation compliance tools, including disclosure as enforcement leverage, self-reporting, and innovative enforcement.



Jodi Short
Bion Gregory Chair in Business Law
UC Hastings College of the Law
shortj@uchastings.edu

My research is on the intersection of public and private regulatory regimes and the theory and practice of regulatory reform. I have studied the factors that contribute to the success or failure of voluntary environmental programs and third-party auditing regimes. I also write on the politics of enforcement and regulatory reform.



Hilary Sigman
Professor of Economics
Rutgers University
hsigman@rutgers.edu

I conduct empirical research on implementation of environmental policy, including the role of enforcement and the effects of cooperative federalism. My work has focused on hazardous waste and water pollution.

Academic Participants (continued)



Sally S. Simpson
Professor, Criminology and Criminal Justice
Director, Center for the Study of Business Ethics, Regulation, & Crime
University of Maryland, College Park
SSimpson@umd.edu

Using factorial surveys, examine factors that influence decision-makers to violate and over comply with environmental law. Also study intervention strategies that lower the offending risk (deterrence).



Mike Toffel
Senator John Heinz Professor of Environmental Management
Harvard Business School
mtoffel@hbs.edu

My research identifies factors that lead companies to improve environmental compliance and performance and to improve occupational safety (fewer injuries) and working conditions, and to exhibit greater transparency with regulators (self-disclosing violations) and other stakeholders. My work has also identified sources of bias in various types of inspections, including of automobile emissions in New York State and of factory working conditions in global supply chains. I am also investigating circumstances in which inspections are more likely to prompt improved working conditions.



Benjamin van Rooij
John S. and Marilyn Long Professor
of US-China Business and Law
School of Law, UC Irvine
bvanrooij@law.uci.edu

My research centers on how law shapes behavior. My original research studied environmental law enforcement, compliance and implementability of regulatory law with a focus on China. Since then I have studied the role citizens can play in regulatory enforcement, and also how environmental regulation can be organized when there is limited resources and independence, with a focus on emerging markets such as China, Brazil, Mexico, and Indonesia. My current work focuses on understanding how law can create deeper levels of compliance where behavior becomes institutionalized and internalized in regulated organizations and their cultures.
